

*APPARENT COVARIATION BETWEEN CHILD HABIT DISORDERS:
EFFECTS OF SUCCESSFUL TREATMENT FOR THUMB SUCKING
ON UNTARGETED CHRONIC HAIR PULLING*

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We evaluated the effects of aversive taste treatment of thumb sucking on untreated trichotillomania (habitual hair pulling) in two children who chronically pulled their hair and sucked their thumbs. A combination of withdrawal and nonconcurrent multiple baseline designs showed that, concomitant with the successful treatment of thumb sucking, hair pulling was also eliminated. The results suggest an efficient method for changing behaviors that are difficult to treat directly.

DESCRIPTORS: covariation, thumb sucking, hair pulling, habit disorders, behavioral pediatrics

Response covariation refers to changes in the frequency of one response that are correlated with changes in the frequency of other responses (Balsam & Bondy, 1985). Early research assessed covariation by focusing on response classes whose members were topographically similar and which covaried directly, such as imitation (Baer, Peterson, & Sherman, 1967) and compliance (Bucher, 1973). Subsequent research focused on topographically dissimilar behaviors that covaried inversely and may or may not have been members of a response class. For example, increased compliance with instructions has been found to covary inversely with decreased inappropriate behavior (Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Russo, Cataldo, & Cushing, 1981). An important next step in behavioral covariation research is the exploitation of

behavioral covariation to increase successes in behavioral treatment programs.

A possibility for analysis is direct covariation between problem behaviors that are easy to target because of their overt and high-rate practice and behaviors that are less easy to target because of their limited, variable, or covert practice. For example, some children suck their thumbs and pull their hair (Altman, Grahs, & Friman, 1982; Sanchez, 1979). On the one hand, thumb sucking is often high rate, overt, and easy to treat (Friman, 1987; Friman, Barone, & Christophersen, 1986). On the other hand, hair pulling can be low rate, covert, and difficult to treat (Friman, Finney, & Christophersen, 1984). Direct covariation between the two behaviors could lead to the elimination of one through successful treatment of the other.

Two previous reports suggested direct covariation between the two behaviors by showing that the successful treatment of thumb sucking coincided with the elimination of hair pulling. One report, however, did not use an experimental design (Sanchez, 1979), and the other did not employ direct measures of thumb sucking (Altman et al., 1982). Using a combination of withdrawal and nonconcurrent multiple baseline experimental designs with direct measures of thumb sucking, we evaluated

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the effect that direct treatment of thumb sucking had on untreated hair pulling in two children who chronically sucked their thumbs and pulled their hair.

METHOD

Subjects

Two boys, Tom, age 2, and Lee, age 5, participated in this study. The parents of both children brought them to a department of pediatrics for treatment of chronic hair pulling. No other complaints were presented. Both children had bald spots resulting from the hair pulling. Tom's bald spots (approximately 5 by 5 cm in diameter each) were above the left occipital lobe, above the left ear, and above the left side of his forehead. Lee's bald spot (approximately 6.4 by 3.2 cm in diameter) was on the crown of his head. The parents of both children reported that hair pulling and thumb sucking had been chronic since infancy.

Tom's hair pulling occurred mostly at naptime and bedtime. Lee's hair pulling occurred at naptime, bedtime, and while watching television. The parents reported that their children rarely pulled hair without a thumb in their mouth, but that they would suck their thumbs without pulling their hair. Both parents had obtained treatment advice from other professionals prior to the study. The advice included various forms of punishment for the presence of the habits and various forms of reward for their absence, none of which had had a discernible effect. Neither set of parents had used aversive taste treatment with the children prior to the study.

Measures and Design

The primary observers in this experiment were the mothers of the two children. They recorded the occurrence of hair pulling (whenever the child held one or more scalp hairs with any combination of two fingers from one or both hands and pulled away from the scalp) and thumb sucking (whenever a thumb simultaneously touched the child's upper and lower lip) with a 10-s interval time sampling procedure. Intervals were signaled by a cassette tape. Prior to the experiment, we trained the moth-

ers by having them practice on other behaviors (e.g., sitting, standing) and on the target behaviors. Practice continued until the mothers reached an average of 90% agreement with the investigators. Observations were conducted approximately twice per week at naptime or bedtime for Tom and during afternoon TV sessions for Lee. Each observation lasted between 5 and 10 min. Tom's mother recorded data until he fell asleep, which took more than 5 but occasionally less than 10 min. Lee's sessions all lasted 10 min.

We used a combination withdrawal (A-B-A-B) and nonconcurrent multiple baseline design across subjects.

Interobserver Agreement

We assessed interobserver agreement during 29% of the sessions, across all phases of the experiment. During these sessions, the mother and a second observer (one of the authors) simultaneously recorded the occurrence or nonoccurrence of the target behaviors. Parent and observer records were compared on an interval-by-interval basis. We calculated measures of agreement on occurrence of the target behaviors by dividing the sum of agreements by the sum of agreements plus disagreements, yielding 98% (range, 94% to 100%) agreement on hair pulling and 97% (range, 87% to 100%) on thumb sucking.

Procedure

Baseline. The mothers did not provide consequences for either hair pulling or thumb sucking.

Aversive taste treatment. The mothers did not treat hair pulling directly. The treatment for thumb sucking involved the application of an aversive taste solution (Stopzit®, Purepac Pharmaceutical Co.) to the children's thumbs. The solution was applied once in the morning, once in the evening before bed, and once each time the mothers observed an occurrence of thumb sucking. The mothers faded the noncontingent applications by successfully eliminating first the morning and then the evening applications after 1-week periods without an observation of thumb sucking. The mothers were instructed to continue to apply the solution con-

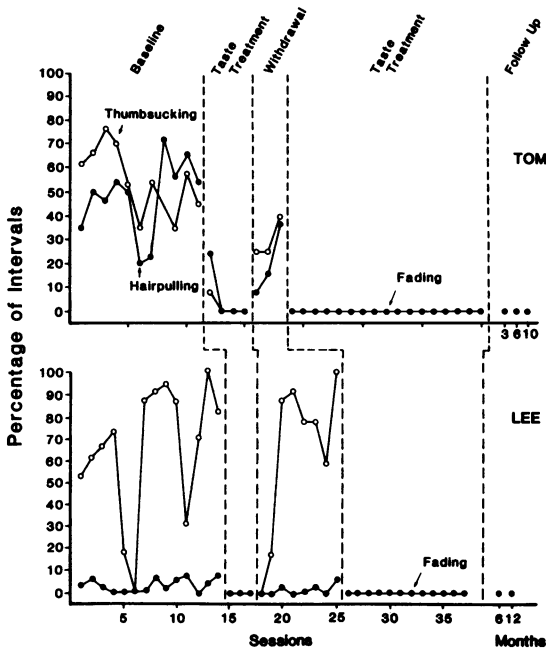


Figure 1. Percentage of intervals in which hair pulling and thumb sucking occurred across baseline and treatment conditions. When the percentages for both behaviors were zero on the same observation day, the data point is one closed circle. Arrows indicate the day on which the treatment was faded.

tingent upon any observation of thumb sucking. Both mothers were also repeatedly instructed not to use other forms of treatment, especially scolding or corporal punishment.

Follow-up. Follow-up observations were scheduled as a culmination of the fading procedure and were conducted under the same conditions as in the experiment (at 3, 6, and 10 months for Tom and 6 and 12 months for Lee).

Social Validation

One photograph was taken during baseline and one during follow-up for both children to document the changes in their scalps (the children were not identifiable from their photographs). Three physicians who were naive to experimental conditions rated the photographs for the presence or absence (dichotomous choice) of abnormal hair loss. To reduce reactivity and bias, we mixed the photographs of the subjects' scalps with photographs of

six other scalps, three with and three without bald spots.

RESULTS

The percentage of time each child sucked his thumb or pulled his hair is presented in Figure 1. The introduction of treatment for thumb sucking rapidly reduced that behavior (baseline means: Tom, 54%; Lee, 64%) and hair pulling (baseline means: Tom, 48%; Lee, 8%) to near zero levels for Tom and zero levels for Lee. The withdrawal of treatment resulted in an acceleration of both behaviors to near baseline levels for Lee (thumb sucking 80%, hair pulling 5%) and approximately half of baseline levels for Tom (thumb sucking 30%, hair pulling 20%). Reintroduction of treatment resulted in a decrease to zero levels for both behaviors in both children. Arrows on the figure indicate the point at which the automatic (morning and evening) applications were faded for both children. The zero levels in the behaviors were maintained after fading and at all follow-up points.

Results of the social validation measure indicated that each physician identified abnormal hair loss in the baseline photographs and "normal" scalps in the follow-up photographs.

DISCUSSION

Elimination of hair pulling was obtained concomitant with successful treatment of thumb sucking in two children who chronically demonstrated both behaviors. Changes in the rates of thumb sucking were closely followed by similar changes in the rates of hair pulling. This study replicates one of the few controlled investigations of thumb sucking (Friman et al., 1986), and also extends the results of the study by Altman et al. (1982) by using direct measures of both thumb sucking and hair pulling. Our study is important because it shows that hair pulling, a behavior that can be difficult to treat in young children, was eliminated through the successful treatment of thumb sucking (cf. Friman et al., 1984). It is clear from the primary data and the assessment of social validation that

lasting clinically significant behavioral changes were obtained in both behaviors, but how the changes were obtained is not as clear.

That the two behaviors are often seen together, especially in infancy and early childhood, has been documented in the clinical literature (Altman et al., 1982; Sanchez, 1979) and the popular press (Spock, 1976). Thus, they may be members of a response class or a response chain shaped by early reinforcing experiences such as feeding. Either account would help address the question of how the successful treatment of thumb sucking covaries with reductions in untreated hair pulling.

Alternatively, it is possible that hair pulling, although untargeted, was, in fact, treated. First, the extent to which parents conformed to requests not to intervene directly on hair pulling cannot be determined. Second, as the contingent applications of taste treatment for thumb sucking were often closely linked in time to hair touching, they may have served to directly punish these behaviors. And third, each time the children put their treated thumbs into their mouths, they made contact with an aversive stimulus. Because both children frequently touched their hair while sucking their thumbs, hair pulling and thumb sucking may have been simultaneously punished. The plausibility of these accounts limits our description of the co-occurrence of the two behaviors to an apparent but not proven covariation.

Maintenance of the treatment's effects is another important issue. The fading procedure was designed to produce an initial suppression of thumb sucking through a combination of contingent and noncontingent applications of taste treatment and subsequently to maintain that suppression with only contingent applications. As in other studies using taste treatment for thumb sucking (Altman et al., 1982; Friman et al., 1986), initial suppression was rapidly achieved but an abrupt withdrawal after a brief time in treatment resulted in acceleration of the target behavior. The fading procedure in this study, however, resulted in a gradual withdrawal of noncontingent treatment applications that lasted 4 to 5 weeks. Included in the procedure was an

instruction to continue use of contingent applications (the need for which was rare for both children). This fading procedure resulted in complete suppression of both behaviors for both children, maintained through the 1-year follow-up.

A final issue involves the increased efficiency that study of behavioral covariation can bring to behavioral treatments. This study shows that direct treatment of an easily targeted disorder (thumb sucking) can lead to favorable changes in an apparently covarying disorder that is less easily targeted (hair pulling). The apparent covariation of the two behaviors was direct, and thus the application of treatment to one behavior appeared to eliminate both. Covariation, however, can be inverse and, in such cases, targeting a problem behavior can increase the rate of a more adaptive, functionally related behavior (Parrish et al., 1986; Russo et al., 1981). There are numerous other possibilities, and continued study of behavioral covariation may yield multiple applications for many serious social problems.

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